SARDAR PATEL UNIVERSITY, BALAGHAT (M.P.)

SCHOOL OF ENGINEERING AND TECHNOLOGY

SYLLABUS

COURSE – BACHELOR OF TECHNOLOGY BRANCH – ELECTRICAL ENGINEERING

SEMESTER – 8th ACADMIC SESSION 2024-25

BEE081

CONTROL SYSTEMS

Course Outcomes ;-The student will be able to

CO1. Demonstrate the fundamental concepts of automatic Control and mathematical modelling of the Systems.
CO2. Determine the transfer function of control system components.
CO3. Analyze the time response of various systems and performance of controllers.
CO4. Evaluate the stability of linear systems using various methods.
CO5. Analyze & Design of compensating networks.

Unit-I

Modeling of dynamic systems: Electrical, Mechanical and hydraulic systems, Concept of transfer function, State space description of dynamic systems: Open and closed loop systems, Signal flow graph, Mason's formula, Components of control systems

Unit-II

Time - domain analysis of closed loop systems: Test signals, time response of first and second order systems, Time domain performance specifications, Steady state error & error constants Feedback control actions: Proportional, derivative and integral control. Solution of state equation: Eigen values & eigenvectors digitalization state transitive matrix, stability Routh-Hurwitz stability analysis.

Unit-III

Characteristics equation of closed loop system root loci, construction of loci, Effect of adding, poles and Zeros on the loci, Stability by root loci.

Unit-IV

Frequency, Domain analysis, Bode plots, Effect of adding, poles and Zeros, Polar plot, Nyquist stability analysis, Relative stability : Gain and phase margins.

Unit-V

Frequency- Domain compensation : lead lag, Lag-lead compensation, Design of compensating networks

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LIST OF EXPERIMENTS

1. To study characteristics of DC &AC Servo motors.
2. To study characteristics of Synchro transmitter receiver pair.
3. To plot Frequency response for the first order system.
4. To obtain time response of second order system.
5. To study a DC position control system.
6. To study a AC position control system.
7. To study the speed control of DC Servo motor using PID.
8. To study a leg and lead compensator.
9. To study temperature control using PID controller.
10. To obtain Bode plot, Nyquist plot for given transfer function using MATLAB.
11. To obtain root locus plot for given transfer function using MATLAB.
12. To check controllability and observability for given state equation using MATLAB.

Reference Books:

1. Automatic Control System – B.C. Kuo, PHI, New York, 1975.
2. Control System Engineering Norman N Nise Wiley India
3. Modern Control Engineering: K. Ogata, PHI. New Delhi, 1992.
4. Digital Control Systems – B. C. Kuo, Oxford Pub.
5. Discrete-Time Control Systems – K. Ogata. PHI. New Delhi
6. Advanced Control Systems N Sarkar PHI Learning
7. Control system –K Padmanabhan I K International

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BEE082

POWER SYSTEM PROTECTION

Course Outcomes ;-The student will be able to

CO1. Explain the need, desirable features & main components of protection system
CO2. Design the various protection scheme for transmission line
CO3. Develop the protection scheme for Alternator, Transformer, Motors & Busbar
CO4. Demonstrate the knowledge of static relays & Numerical relays
CO5. Select the proper type & rating of circuit breaker and fuses for various applications

Unit-I

Fault Analysis

Faults in power systems, single line diagram, equivalent impedance diagram, per unit reactances. Analysis (using matrices) of power systems by symmetrical components under: (a) Three phase short circuit. (b) Line to line fault. (c) Line to ground fault. (d) Double line to ground fault. Sequence networks and their inter connections for different types of faults, effects of fault impedance. Current Limiting Reactors: Applications, types, construction and location of current limiting reactors, short circuit calculation using reactors**.**

Unit-II

Relays

General considerations, sensing of faults, construction of electro-magnetic attraction and induction types relays, Buchholz and negative sequence relay, concept of reset, pick up, inverse time and definite time characteristics, over current , over voltage, directional, differential and distance relays on R-X diagram. Static Relays: Introduction, advantage and limitation of static relays, static over current, directional, distance and differential relays.

Unit-III

Protection

Types & detection of faults and their effects, alternator protection scheme (stator,rotor, reverse power protection etc.). Power transformer protection (external and internal faults protection), generator-transformer unit protection scheme, bus bar protection. Transmission line protection (current/time grading, distance), Pilot relaying schemes, power line carrier protection.

Unit-IV

Switchgear

Theory of current interruption- energy balance and recovery rate theory, arc quenching, recovery and restriking voltages. Types of circuit breakers. bulk oil and minimum oil, air break and air blast, Sulphur-hexa-floride (SF6) and vacuum circuit breakers. Rating selection and testing of circuit breakers/operating mechanisms. LT switchgear, HRC fuses, types construction and applications.

Unit-V

Modern Trends In Protection

Electronic relays, static relays functional circuits: comparators, level detectors, logic and training circuits, microprocessor and computer based protection schemes, software development for protection, security &reliability.

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LIST OF EXPERIMENTS:

1. To study characteristics of under voltage & over voltage relay.
2. To study characteristics of IDMT over current relay.
3. To study characteristics of earth fault relay.
4. To study characteristics of MCB & HRC Fuse.
5. To study the differential protection scheme for single phase transformer.
6. To study the differential protection scheme for three phase transformer.
7. Determination of sequence impedance of cylindrical rotor synchronous machine.
8. Determination of sequence impedances of three phase transformer.
9. To find fault current and fault voltage for unloaded alternator in case of LG fault, LL fault, LLG fault & LLL fault.
10. To study performance of current transformer(C.T.) & potential transformer(P.T.).

References Books:

1. Van A. R & Warrington C., " Protective Relays : Their Theory and Practice", Vol 1 &2, Chapman and Hall.
2. Paithankar & Bhide – Fundamentals of Power System Protection –PHI Learning
3. Paithankar Y. O.," Transmission Network Protection: Theory and Practice", Marcel Deicker, Inc.
4. GEC Measurements," Protective Relays : Application Guide", GEC Measurements.
5. Masson R.J., Art & Science of Protective Relaying.
6. J & P Switchgear handbook Ravindra Nath B., and Chandar M., Power systems protection and switchgear
7. Rao Sunil S, Switchgear and protection. 7Crane P.H.C., Switchgear Principle.
9. The Elementary Council, "Power System Protection", Vol.1,2 &3, Peter Peregrinus Ltd.
10. Badriram& Vishwakarma, Power System Protection.

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BEE 083(A)

ADVANCED ELECTRICAL DRIVES

Course Outcomes ;-The student will be able to

CO-1 Analyze the operation and performance of the converter, chopper fed dc drive.

CO-2 Analyze the operation of both classical and modern induction motor drives.

CO-3 Use Computer-aided techniques for the design of the current and speed controllers for a closed loop solid-state DC motor drive

CO-4 Able to Select the drives for any Industrial application.

Unit-I

Review of electric motors &Solid state converters: Speed control techniques of DC, Induction & synchronous motor, Converters, inverters, chopper and cyclo converter operation, Effects of power electronic equipments on load side & supply side. Review of closed loop controllers, sensors &transducers : PI, PID, Variable structure. AC,

Unit-II DC& Pulse tacho- generators. DC Drives : Converter & chopper fed DC drive, Reversing, Starting, Regenerative breaking , Four quadrant operation, High power application. AC Drive: Inverter & cyclo converter fed drive, Vector control, Sensor less operation, Linear electrical motor

Unit-III

Special Drives: Switched reluctance & permanent magnet brushless DC Operation, Converters, Characteristics &Control, PLC based drives.

Unit-VI

Servo drives & stepper motor- AC& DC Servomotor, Stepper motor, Control techniques, **C** Controllers, Micro stepping, Sensor less operation.

Unit-V

Power Quality & energy Conservation- Line Side pollution, standards, Harmonic elimination techniques in converter, Filters, Energy efficient electric motors, Pay back periods, Energy conservation through sold state control.

Reference Books:

1. Ned Mohan, T.M. Undeland, W.P. Robbins, Power Electronics-Converters, Applications and design", John Wiley & Sons.
2. J.M.D. Murphy, F.O. Turnbull, "Power Electronic Control of AC motors", Pergamon Press.
3. P.C. Sen, D.C. drive, Pergamon Press
4. Sivanagaraju–Power Semiconductor Drives –PHI Learning
5. B.K. Bose, Power Electronics & AC drive prentice Hall.
6. Dubey G.K. "Power semi Conductor controller drives, Prentice Hall. Vedam Subramanyam, "Electrical Drives".
7. T.J.E. Miller, Switched Reluctance & P.M. B.L. DC motor, Pergamon Press
8. P.V. Rao, "Power semiconductor Drives", BS Publications.

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BEE 083(B)

PROCESS CONTROL

Course Outcomes ;-The student will be able to

CO1. Explain the various Electronic Instruments for measurement of electrical parameters. CO2. Analyze the different signals.
CO3. Demonstrate the signal counting, recording and working of digital readout devices.
CO4. Apply various signal processing tools as per requirement.
CO5. Develop ladder diagrams & programs for PLC.

Unit I

Special characteristics of process systems large time constants, interaction, multistaging, pure lag; control loops for simple systems and their Dynamics & stability.

Unit II

Generation of control action in electronic and pneumatic controllers. Control valves, valve positioners, relief and safety valves, relays, volume boosters, pneumatic transmitters for process variable. Tuning of controllers - Zeigler Nichols and other techniques.

Unit III

Different control techniques and interaction of process parameters e.g. feed forward, cascade, ratio, over- ride controls Batch continuous process controls. Feed forward Control schemes.

Unit IV

Various process schemes / unit operations and their control schemes e.g. distillation columns, absorbers, heat exchangers, furnaces, reactors, mineral processing industries, etc. Use of control schemes for process optimization.

Unit V

Advanced control strategies with case studies. Use of DDC and PLC. Introduction to supervisory control. Conversion of existing control schemes in operating plants, data loggers.

Reference Books:

1. Dale Patrick, Stephen Fardo, "Industrial Process Control System".
2. Shinskey F.G., "Process Control System", III Ed., McGraw Hill.
3. Smith C.A. & A.B. Corripio, "Principle & Practiced Automatic Process Control",
4. J. Willey. Rao M &S.Qiv, "Process Control Engg.", Gorden & Breach.

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BEE-083(C)

COMPUTER APPLICATION TO POWER SYSTEMS

Course Outcomes ;-The student will be able to

CO-1 Formulate the incidence, network matrices and model the power system components.

CO-2 Perform steady state power flow analysis of power system networks using Gauss-Seidel, Newton-Raphson and Fast decoupled iterative methods.

CO-3 Analyze short circuit faults in power system networks using ZBus method.

CO-4 Perform contingency analysis for power system networks using ZBus method.

Unit I

Models of power system components, network model using graph theory, formation of Z bus, transmission line models, regulating transformer, line loadability, capability curves of alternator.

Unit II

Control of load bus voltage using reactive power control variable, SVC & SVS, Regulated shunt compensation, series and shunt compensation, Uniform series and shunt compensation and effect on loadability of transmission lines.

Unit III

Sensitivity analysis- General sensitivity relations, generation shift distribution factors, line outage distribution factors, compensated shift factors, sensitivity associated with voltage-VAR, sensitivities relating load bus voltage changes in terms of PV bus voltage changes, sensitivity relating changes in reactive power generation for changes in PV Bus Voltage.

Unit IV

Power system security - Security functions, Security level, contingency analysis, security control, economic dispatch using LP formulation, pre-contingency and post-contingency, corrective rescheduling.

Unit V

Voltage stability - Difference between voltage and angle stability, PV Curve for voltage stability assessment, proximity and mechanism, modal analysis using reduced Jacobian, participation factor, effect of series and shunt compensation on voltage stability, effect of load models.

References Books:

1. Chakrabarti –Power System Analysis operation & Control – Power Generation, Operation and Control by A.J. wood and B.F. Wollenberg John Wiley & Sons Inc. 1984.
2. Computer methods in power systems analysis - by stage G.W. and E.L. Abiad A.H.
3. Mc Graw Hill. Computer Techniques in Power Systems Analysis- Pai M.A. Tata Mc Graw Hill.
4. Computer Modeling of Electrical Power Systems, Arrillaga J. Arnord C.P Harker B.J.
5. John Wiley &Son
6. Computer Aided Power Systems Analysis Kusic G.L.- 2nd Edition, CRC Press
7. Modern Power Systems Analysis Nagrath I.J. and Kothari D.P. Tata Mc Graw Hill.
8. Power System Analysis Grainger J.J. &Stevnson W.D. Mc Graw Hill.
9. Power System Stability and control -P Kundur ,IEEE Press 1994.
10. Advance Power Systems Analysis and Dynamics Singh L.P.

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COURSE – BACHELOR OF TECHNOLOGY BRANCH – ELECTRICAL ENGINEERING

SEMESTER – 8th ACADMIC SESSION 2024-25

BEE 084(A)

RENEWABLE & NON-CONVENTIONAL ENERGY SYSTEMS

Course Outcomes ;-The student will be able to

CO-1 Ability to create awareness about renewable Energy Sources and technologies
CO-2 Ability to get adequate inputs on a variety of issues in harnessing renewable Energy.
CO-3 Ability to recognize current and possible future role of renewable energy sources.
CO-4 Ability to explain the various renewable energy resources and technologies and their applications
CO-5 Ability to understand basics about biomass energy
CO-6 Ability to acquire knowledge about solar energy

Unit - I

Renewable Energy Systems

Energy Sources, Comparison of Conventional and non-conventional, renewable and non-renewable sources. Statistics of world resources and data on different sources globally and in Indian context. Significance of renewable sources and their exploitation. Energy planning, Energy efficiency and management.

Unit - II

Wind Energy System

Wind Energy, Wind Mills, Grid connected systems. System configuration, working principles, limitations. Effects of wind speed and grid conditions. Grid independent systems - wind-battery, wind- diesel, wind-hydro biomass etc. wind operated pumps, controller for energy balance.Small Hydro System Grid connected system, system configuration, working principles, limitations. Effect of hydro potential and grid condition. Synchronous versus Induction Generator for stand alone systems. Use of electronic load controllers and self excited induction generators.Wave Energy System: System configuration: grid connected and hybrid Systems.

Unit - III

Solar Radiation:

Extraterrestrial solar radiation, terrestrial solar radiation, Solar thermal conversion.Solar Phototonic System: Solar cell, Solar cell materials, efficiency, Characteristics of PV panels under varying insulation. PV operated lighting and water pumps, characteristics of motors and pumps connected to PV panels.

Biomass Energy System: System configuration, Biomass engine driven generators, feeding loads in stand-alone or hybrid modes, Biomass energy and their characteristics.

Unit - IV

Energy from oceans

Ocean temperature difference, Principles of OTEC, plant operations, **Geothermal Energy**

Electric Energy from gaseous cells, Magneto-hydro generated energy, Non hazardous energy from nuclear wastes, Possibilities of other modern non-conventional energy sources.

Unit - V

Electric Energy Conservation

Energy efficient motors and other equipment. Energy saving in Power Electronic controlled drives. Electricity saving in pumps, air-conditioning, power plants, process industries, illumination. Methods of Energy Audit.

Measurements systems; efficiency measurements. energy regulation, typical case studies, various measuring devices analog and digital, use of thyristers.

References Books:

1. John Twidell& Toney Weir, Renewable Energy Resources, E & F N Spon.

2. El-Wakil, Power Plant Technology, McGraw Hill.

3. Rai G D, Non-conventional Energy Resources, Khanna.

4. F Howard E. Jordan, "Energy-Efficient Electric Motor & their Application-II", Plenum Press, New York USA

5. Anna Mani, "Wind Energy Resource Survey **in** India-Ill", Allied Publishers Ltd., New Delhi,

6. S.P. Sukhatme: Solar Energy, TMH-4e,

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BEE084(B)

POWER SYSTEM PLANNING & RELIABILITY

Course Outcomes ;-The student will be able to

CO-1 Be acquainted with the main concept of probability theory.

CO-2 Understand the factors of long term reliability of power system.

CO-3 Be acquainted with the reliability model of generating unit.

CO-4 Be able to evaluate power system transmission, distribution reliability.

CO-5 Understand the methodology of correlated and uncorrelated load models.

UNIT-I

Probability Theory

Review of Probability Theory Element of probability theory Probability Distribution, Random variable, Density and distribution functions. Mathematical expectation. Binominal distribution, Poisson distributions, Normal distribution, Exponential distribution, Weibull distribution.

UNIT-II

Reliability of Engineering Systems

Component reliability, Hazard models, Reliability of systems wit non-repairable components, series, Parallel, Series-Parallel, Parallel-series configurations. Non-series-parallel configurations, minimal tie-set, minimal cut-set and decomposition methods. Repairable systems, MARKOV process, Long term reliability, Power System reliability.

UNIT-III

Reliability model of a generating unit

Reliability model of a generating unit, State space methods, Combing states, sequential addition method, Load modeling, Cumulative load model, merging of generation and load models, Loss of load probability, Percentage energy loss, Probability and frequency of failure, Operating reserve calculations.

UNIT-IV

Power Network Reliability,

Power Network Reliability, Weather effect on transmission lines, Common mode failures, Switching after faults, three, state components, Normally open paths, Distribution system reliability.

UNIT-V

Bulk Power supply systems

Composite System Reliability Bulk Power supply systems, Effect of varying load, Inter connected systems, correlated and uncorrelated load models, Cost and worth of reliability.

References Books:

1. J. Endreny, Reliability Modeling in Electric Power Systems, John Wiley & Sons.
2. RoyBillinton& Ronald, N allan, Reliability Evaluation of Power Systems, Plenum Press, New York.

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BEE-084(C)

EHV A.C. AND D.C. TRANSMISSION

Course Outcomes ;-The student will be able to

CO-1 Ability to understand the principles and types of HVDC system.

CO-2 Ability to acquire knowledge on DC link control.

CO-3 Ability to understand the concepts of reactive power management, harmonics and power flow analysis.

CO-4 Ability to analyze and understand the concepts of HVDC converters.

CO-5 Ability to get knowledge about Planning of DC power transmission & comparison with AC power transmission.

CO-6 Ability to understand the importance of power flow in HVDC system under steady state.

UNIT-I

Constitution of EHV a.c. and d.c. links

Constitution of EHV a.c. and d.c. links, Kind of d.c. links, Limitations and Advantages of a.c. and d.c. transmission, Principal application of a.c. and d.c. transmission, Trends in EHV a.c. and d.c. transmission, Power handling capacity. Converter analysis garetz circuit, Firing angle control, Overlapping.

UNIT-II

FACTS devices

FACTS devices, basic types of controller, series controller, static synchronous series compensator(SSSC), thyristor-controlled series capacitor(TCSC), thyristor controlled series reactor(TCSR), shunt controller (STATCOM), static VAR compensator(SVC), series-series controller, combined series-shunt controller, unified power flow controller(UPFC), thyristor controlled phase shifting transformer(TCPST).

UNIT-III

Components of EHV d.c. system

Components of EHV d.c. system, converter circuits, rectifier and inverter valves, Reactive power requirements, harmonics generation, Adverse effects, Classification, Remedial measures to suppress, filters, Ground return. Converter faults & protection harmonics misoperation, Commutation failure, Multiterminal D.C. lines.

Unit-IV

Control of EHV d.c. system

Control of EHV d.c. system desired features of control, control characteristics, Constant current control, Constant extinction angle control. Ignition Angle control. Parallel operation of HVAC & DC system. Problems & advantages.

Unit-V

Travelling waves on transmission systems

Travelling waves on transmission systems, Their shape, Attenuation and distortion, effect of junction and termination on propagation of traveling waves. Over voltages in transmission system. Lightning, switching and temporary over voltages: Control of lighting and switching over voltages

Reference Books:

1. S. Rao,- "EHV AC & DC Transmission" Khanna pub.
2. Kimbark,-" HVDC Transmission" jodhn willy & sons pub.
3. Arrillaga,- "HVDC Transmission"2 ns Edition ,IEE londan pub.

4 Padiyar, -"HVDC Transmission" 1 t Edition ,New age international pub.

5 T.K. Nagsarkar,M.S.Sukhiza, -"Power System Analysis", Oxford University

6 Narain.G. Hingorani, l. Gyugyi-"Undustanding of FACTS concept and technology", John Wiley & sons

7 P.Kundur- "H.V.D.C. Transmission" McGraw Hill Pub.

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BEE085P

MAJOR PROJECT

The objectives of the course 'Major Project' are

To provide students with a comprehensive experience for applying the knowledge gained so far by studying various courses.

To develop an inquiring aptitude and build confidence among students by working on solutions of small industrial problems.

To give students an opportunity to do some thing creative and to assimilate real life work situation in institution.

To adapt students for latest developments and to handle independently new situations.

To develop good expressions power and presentation abilities in students.

The focus of the Major Project is on preparing a working system or some design or understanding of a complex system using system analysis tools and submit it the same in the form of a write-up i.e. detail project report. The student should select some real life problems for their project and maintain proper documentation of different stages of project such as need analysis, market analysis, concept evaluation, requirement specification, objectives, work plan, analysis, design, implementation and test plan. Each student is required to prepare a project report and present the same at the final examination with a demonstration of the working system (if any).

The faculty and student should work according to following schedule: i) Each student undertakes substantial and individual project in an approved area of the subject and supervised by a member of staff.

ii) The student must submit outline and action plan for the project execution (time schedule) and

the same be approved by the concerned faculty.

iii) At all the steps of the project, students must submit a written report of the same.

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REPORT LAYOUT

The thesis has to be organised in the following order.

1. Cover Page
2. Inside Title Page
3. Certificate signed by the Supervisor(s) (in the stipulated format)
4. Declaration signed by the Candidate (in the stipulated format)
5. Acknowledgements
6. Abstract
7. Table of Contents
8. List of Figures
9. List of Tables
10. Abbreviations/ Notations/ Nomenclature (if any)
11. Text of the Report

Chapter 1

Chapter 2

…..

…..

12. References

13. Appendices (if any)

14. Non-paper materials (if any)

The formats to be followed for various headings are as follows

1. COVER PAGE*:* The content, relative font size

and locations of various items in the page should match with those given

in sample sheet 1. All copies to be submitted to the various offices at IIST

should be soft bound with white cardboard and black rexin in spine.

2. INSIDE TITLE PAGE: Same as that of cover page except but

printed in bond paper as given in 2.3.4

3. CERTIFICATE: See sample sheet 2. The content, relative font size

and locations of various items in the page should match with those given

in sample sheet 2.

4. ***DECLARATION:*** The content, relative font size

and locations of various items in the page should match with those given

5. ***ACKNOWLEDGEMENTS:***

6. ABSTRACT:

7. TABLE OF CONTENTS:

8. LIST OF FIGURES:

9. LIST OF TABLES:

10. ABBREVIATIONS/ NOTATIONS/ NOMENCLATURE:

11. CHAPTERS: The chapters may have Introduction including literatures

referred, Materials, Methods used, Results, Discussions and Conclusions.

See sample sheet 10.

12. REFERENCES: To be provided immediately after the last chapter.

See sample sheet 11.

13. APPENDICES: See sample sheet 12.

14. NON-PAPER MATERIALS (if any)

Each of the items - Inside cover page, Certificate, Acknowledgements,

Abstract, Table of Contents, List of Figures, List of Tables, Abbreviations,

Notations, Nomenclature, each new Chapter, References and each new

Appendix should start on an odd page i.e., on the right side

GENERAL GUIDELINES

2.1. Report Size

Report may contain maximum of about 100 pages including references and appendices.

2.2. Paper Size

Use A4 size paper (210 mm wide and 297 mm long).

2.3. Paper Quality

White bond paper weighing 85 g/m2 or more should be used. Essentially the same quality of paper should be used throughout. Photographs or images with dense colors may be printed in single side on glossy paper.

2.4. Margins

A margin of 35 mm is to be provided on left and right sides, whereas top and bottom margins should be 30 mm. No print matter should appear in the margin except the page numbers. All page numbers should be centered inside the bottom margin, 20mm from the bottom edge of the paper.

2.5. Font

Times New Roman (TNR) 12 point font has to be used throughout the running text. The captions for tables and figures should have font size of 11 and foot notes should be set at font size 10. Font sizes for various levels of headings are given in section 2.7.6

2.6. Line Spacing

The line spacing in the main text should be 1.5. Single line spacing should be given for quotations, abstract, figure captions, table captions, figure legends, footnotes, and references. The equations, tables, figures, and quotations should be set off from the main text both before and after with spacing of 1.5. Two consecutive paragraphs should be separated by triple line spacing.

2.7. Headings

Following format has to be followed in heading of chapters and sections.

CHAPTER 3

TITLE PAGE-CENTERED TNR 17-POINT BOLD ALL CAPS

3.1. Section Heading

Left aligned with number, TNR 17 points, bold and leading caps

3.1.1. Second level section heading

Left aligned with number, TNR 14 points, bold and sentence case.

3.1.1.1. Third level section heading

Left aligned with number, TNR 12 points, bold and sentence case.

Fourth-level section heading

Numbered subsections beyond third level are not recommended. However, fourth-level subsection headings may be included without numbering, TNR 12-point font, left aligned and italicized.

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BEE -086P

MODELLING & SIMULATION LAB

Course Outcomes -On successful completion of the course, the students will be able to:

CO1: DEFINE the features of MATLAB as a programming tool and implement all the features of MATLAB software.

CO2: WRITE programming in MATLAB to perform mathematical manipulation and interactive computations of matricesand their uses.

CO3: DEVELOP virtual experiment setup for different electrical and power electronics experiments under MATLABSimulink

CO4: DESIGN plots and export this for use in reports and presentations.

CO5: WORK as a 'MATLAB programmer' in the industry because of the hands on practical sessions.

COURSE CONTENT (in terms of specific objective)

1. Introduction to MATLAB programming:

    1.1. Functions and operation using variables and arrays.

        1.1.1. To learn algebraic, trigonometric and exponential manipulation.

        1.1.2. To learn Arithmetic, Relational and Logic operator.

    1.2. Matrix formation and its manipulation.

    1.3. Vector manipulation:

        1.3.1. Use of linspace to create vectors.

        1.3.2. To create, add and multiply vectors.

        1.3.3. Use of sin and sqrt functions with vector arguments.

    1.4. Plotting:

        1.4.1. Two dimensional Plots and sub plots

        1.4.2. Label the plot and printing.

1.5. Write and execute a file to plot a circle, impulse, step, ramp, sine and cosine functions.

2. Introduction to SIMULINK:

2.1. Use of Commonly used blocks, Math operation block and Display block from SIMULINK library.

2.2. Use of logical and relational operator block.

2.3.Use of Sim-Power system block to use Electrical sources, elements and Power electronics devices.

2.4.SIMULATION Excercies; LIST OF EXPERIMENTS

2.4.1. Verification of Network theorems. (any two)

2.4.2. Simulation of a half wave uncontrolled rectifier.

2.4.3. Simulation of 1-phase full bridge controlled rectifier.

2.4.4. Simulation of step-down chopper

2.4.5. To observe the waveform of single phase full wave rectifier circuit with R load

2.4.6. To observe the waveform of single phase half wave thyristor circuit with R load

2.4.7. To observe the waveform of single phase full wave thyristor circuit with RL & RLE load

2.4.8. To observe the waveform of single phase semi convertor circuit with RL & RLE load

REFERENCE

1. Shailendra Jain "Modeling **and Simulation** using **MATLAB Simulink"** wiley india &Sons.
2. “Modelling And Simulation Using MatlabSimulink”,2011DrShailendra Jain, Willey India.
3. “Matlab Programming”,Rudraprasad

SARDAR PATEL UNIVERSITY, BALAGHAT (M.P.)

SCHOOL OF ENGINEERING AND TECHNOLOGY

SYLLABUS

COURSE – BACHELOR OF TECHNOLOGY BRANCH – ELECTRICAL ENGINEERING

SEMESTER – 8th ACADMIC SESSION 2024-25

BEE-087P

INDUSTRIAL TRAINING

SCHEME OF STUDIES

Duration: 2 weeks after the VI semester in the summer break, Assessment in VII semester.

SCHEME OF EXAMINATION :

For the assessment of industrial training undertaken by the students, following components are considered with their weightage.

(a) Term work

In Industry	Marks allotted
1. Attendance and General Discipline -	05
2. Daily diary Maintenance -	05
3. Initiative and participative attitude during training -	05
4. Assessment of training by Industrial Supervisor/s	05
TOTAL	20

(b) Practical/Oral Examination (Viva-Voce)

In Institution	Marks allotted
1. Training Report –	10
2. Seminar and cross questioning (defense) -	20
TOTAL	30

Marks of various components in industry should be awarded to the students, in consultations with the Training and Placement Officer/Faculty of Institute, Who must establish contact with the supervisor/Authorities of the organisation where, students have taking training to award the marks for term work and I/c of training from Industry. During training students will prepare a first draft of training report in consultation with section in-charge. After training they will prepare final draft with the help of T.P.O./Faculty of the institute. Then they will present a seminar on their training and they will face viva-voce on training in the institute.

1.1 OBJECTIVE OF INDUSTRIAL TRAINING

The objective of undertaking industrial training is to provide work experience so that student's engineering knowledge is enhanced and employment prospects are improved. The student should take this course as a window to the real World of Work and should try to learn as much as possible from real life experiences by involving and interacting with industry staff. Industrial training also provides an opportunity to students to select an engineering problem and possibly an industry guide for their Major Project in final semester.

Industrial training of the students is essential to bridge the wide gap between the classroom and industrial environment. This will enrich their practical learning and they will be better equipped to integrate the practical experiences with the classroom learning process**.**

1.2 INDUSTRIAL TRAINING

DAILY DIARY

Name of the Trainee:…….College:…….

Industry/Work place:……..Week No.:……

Department/Section:…….Date:……
…

Dates